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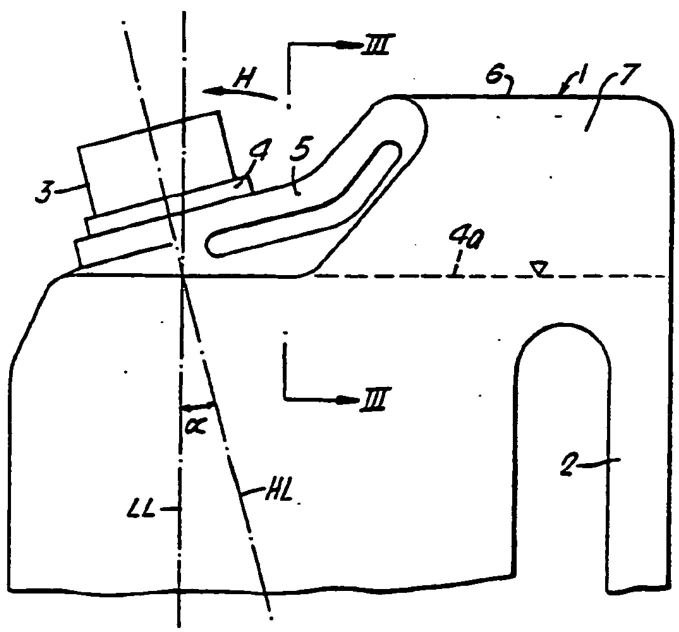
(54) Title: A METHOD IN THE PRODUCTION OF CONTAINERS HAVING IMPROVED POURING PROPERTIES, AND A CONTAINER HAVING SUCH PROPERTIES

(57) Abstract




A method in the production of a container for improving the pouring properties of the container, and a container having improved pouring properties. In order to avoid a pulsating discharge of the content of a container (1) when it is to be emptied, it is suggested according to the invention to provide a channel portion (5) in the area of the pouring spout (3) of the container (1), preferably at or closely beneath the root (4) of said spout. Channel portion (5) extends from the root (4) of pouring spout (3) in a direction opposite to the pouring direction (H), said channel portion (5) having an end portion (8) in the area of the root (4) of the pouring spout reducing the free discharging area ($A_V$, $A_L$) of the pouring spout for the content of said container, but at the reduced area ($A_L$) leaving the channel porti n (5) open for inflow of air (12) into container (1) to the space (7) that is emptied of its content. Further impr vement is achieved when the angle (α) of the pouring spout (3) of the container with a vertical axis (LL) through the container (1) is selected in dependence of the positioning of the pouring spout, its height, and clear opening or the ratio between liquid discharge area ($A_V$) and air inflow area ($A_L$), or a combination f one or more of said factors in order to achieve an optimal result.

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A method in the production of containers having improved pouring properties, and a container having such properties.

The present invention relates to a method in the production of containers with the aim of improving the pouring properties of the container.

The invention, also, relates to a container with improved pouring properties.

When a container containing a liquid that may be more or less viscous is to be emptied, air will enter into the container at the same time as the liquid is discharged. Such a replacement of liquid by air will often cause the pouring liquid to pulsate, resulting in the liquid flow not landing where it was originally meant to land.

In order to avoid such a pulsating discharge from a container it was previously suggested in connection with petrol cans (jerrycans) to provide a conduit in the pouring aperture, said conduit extending from the upper rim of the pouring spout which extends upwards from the container portion, and extending some distance along the upper portion of the container. Such a conduit is, however, disadvantage when the container is to be filled, reducing the access area of a filling nozzle. Furthermore, such a conduit will be unsuitable for screw caps or the like based on cone tightening, i.e. a groove shaped portion inside the cap closing about the upper rim of the pouring spout.

It is an object of the present invention to give directions of how to avoid a pulsating discharge of the content of a container when said container is emptied, at the same time as the disadvantages of the previously known conduit arrangements in jerrycans are avoided.

According to the invention this object is achieved by a method of the above mentioned kind that is characterized in that in the area of the pouring spout of the container, preferably at or just beneath the root of said pouring spout a channel portion is formed to extend from the outlet portion of said pouring spout in a direction opposite to the discharging direction, said channel portion reducing the free discharging

cross section in the area of the nozzle portion, but at the reduced area leaving the channel portion open for air to flow into the container.

It is, thus, achieved that the discharging area for the liquid is smaller than the cross sectional area of the pouring spout and these areas may, obviously, be adapted for securing optimal pouring properties. The difference between the liquid discharging area and the cross section of the pouring spout equals the area of entering air at the outlet of the channel portion that will not be covered by the pouring liquid.

The channel portion reducing the free pouring area of the pouring spout in the nozzle portion is suitably provided so deep in the pouring spout that it does not prevent a filling nozzle from being inserted. This means that previously known containers having a certain outside shape and size of the pouring spout can still be filled by the same kind of filling nozzle as is at present used in the market.

It should be understood that a container manufactured according to that method may comprise not only one channel portion, which is suitable when the container has a shape designed for pouring in one direction, but may comprise several channel portions, especially in connection with containers not beeing designed for pouring in a special direction.

There are, however, several geometric conditions playing a part in achieving optimal pouring properties of containers as mentioned above, and these geometric conditions, as well as the manner of adapting them to the viscosity of the liquid, are the basis of a further development of the present container.

In fact, it was found that it is not only important that the discharge area and the cross sectional area of the pouring spout are optimally adapted but, also, that a correct angle of the pouring spout in relation to a vertical plane through the container is selected. .

This pouring spout angle is of great importance, not only in connection with said relati nship between discharging area and cross sectional area but, also, in connection with the height of said pouring spout an increased height or length of the pouring spout necessitating compensation by a larger angle of the pouring spout, i.e. a larger angle with the portion of the container opposite to its handle or holding side.

In this manner it is possible to avoid that a possibly high pouring spout causes the liquid level to cover both the liquid discharge area and the channel portion for air entering the container, which means that the entire outlet might be filled with liquid if discharging occurs very rapidly. This would, in turn cause the air channel to be blocked with initial discharging, and the necessary air inlet effect would, thus, not be achieved.

Furthermore, the positioning of the pouring spout will effect the pouring properties of the container, and the positioning of the spout will at the same time, effect the level of liquid possible in the filled container.

If the pouring spout is displaced towards the handle side the pouring spout may have a more acute angle in relation to the vertical plane, but this angle, in turn, is dependent on the height of the pouring spout as well as on other geometric conditions of the discharging area relative to this area of the channel portion.

Additionally, the geometric conditions of the container and this pouring spout are dependent on the viscosity or inertia of the liquid, a liquid of greater viscosity tending more to block the opening of the pouring spout before it flows over the outer rim of the pouring spout. In other words, a liquid of great inertia tends more to provide a so called flood wave effect when discharging is started abruptly with a full container. For viscous liquids it is, thus, important to have a free pouring opening that is as large as possible. At the same time the positioning of the pouring spout and its angle as well as its height, and the filling level of the container must be mutually adapted for a best possible result to be achieved.

The invention will be disclosed in more detail in the following with reference to the drawing.

Figure 1 is a partial side elevation of a container designed in accordance with the teachings of the present invention.

Figure 2 is a partial plan view of the container in the pouring spout area.

Figure 3 is a sectional view aling line III-III in Figure 1.

Figure 4 is an elevation like Figure 1 showing the container in a pouring position.

Figures 5-7 are diagrammatic side elevations of an alternative embodiment of a container shown in various pouring positions and having the pouring spout positioned closer to the center of the container.

Figures 8 and 9 are diagrammatic side elevations of a further embodiment of a container having its pouring spout positioned still closer to the handle.

Figures 10 and 11 are diagrammatical side elevations of still another embodiment where the pouring spout is positioned on the opposite side of the handle and where the pouring spout is given alternative angles.

Figure 12 is a diagrammatic side elevation like Figure 1, where the free discharging area is made larger.

Figure 13 is a diagrammatic . side elevation like Figure 11 showing an alternative pouring spout having a larger discharge angle, but a moderate free discharge area.

In Figure 1 a side elevation of a container is shown, which container is generally designated 1 and may be manufactured from a plastic material, e.g. a synthetic resin.

Container 1 is shaped so as to make it natural to discharge its content in one definite direction, said container being provided with a handle 2 on one side, whereas it is provided with a pouring spout 3 on the other side. The natural discharge direction will, thus, be with the pouring spout 3 inclined in the direction of arrow H when the user holds the handle 2.

Container 1 may be filled with a more or less viscous liquid, e.g. white spirit, oil, juice, fizzy lemonade, etc. and it may e.g. be filled to level 4a before any pouring takes place.

In the area of the p uring spout 3 of the container, preferably at or closely beneath the root 4 of the pouring spout a channel portion 5 is provided, as will appear from Figures 2 and 4 as well. Said channel portion 5 extends from the root of pouring spout 3 in a direction opposed to the discharge direction H, i.e. upwards toward the upper portion 6 of the container where it opens into space 7 which is not

filled with liquid in the shown embodiment of container 1.

As most clearly appearing from Figure 2, channel portion 5 will have a rim portion 8 reducing the free discharge area of the pouring spout in the area of the root 4 of pouring spout 3. In other words, the liquid to be discharged from container 1 will only pass through pouring spout 3 through the area designated $A_V$ in Figure 2, whereas area $A_L$ covered by rim portion 8 of the channel portion 5 will be available for air flowing into the container when said container is in a pouring position.

In Figure 4, which is an elevational view like Figure 1, it is disclosed how discharging liquid 11 will only pass through area $A_V$, whereas area $A_L$ is at disposal for air flowing in through pouring spout 3 and advancing through channel portion 5 to its upper end 13 where the air flows into the space 7 above the level 4a' of liquid.

With continued pouring the pouring position of container 1 will change, implying that the level 4' of liquid will change height as well as inclination, but all the time the liquid flow from the container will be limited to area $A_V$ without interfering with the inward flow of air through area $A_L$ and channel portion 5.

Such emptying of the container 1 means that the air may flow freely into the container and there will be no suction effect that might interfer with a uniform discharge jet from the container.

It should be understood that channel portion 5 may suitably be provided during the manufacturing of container 1 as an integral portion of the container, as said container 1 may be manufactured from a material permitting shaping, moulding, compression moulding, or the like, e.g. from plastic. It should, however, also be understood that other materials may be considered as well, e.g. glas, metal, cardboard or a mixture of these materials.

Moreover, it is not excluded that the channel portion may be provided after the container has been produced, possibly in the form of an added portion or as a part that is welded or otherwise joined with the container.

In the shown embodiment of a container 1 said container

is shaped for pouring in a definite direction. In this case one channel portion extending from the outlet area of pouring spout 3 in the opposite direction of pouring direction H should be sufficient.

The invention may, however, also be used in connection with containers with a shape for pouring in an arbitrary direction. Such containers may be provided with several channel portions, preferably being uniformly distributed about the pouring spout area and each of them contributing to a reduction of the free discharging area of the pouring spout in the area of its opening portion, however, at the reduced area leaving the channel portion in question open for air flowing into the container in the space emptied of its content.

In the shown embodiment rim portion 8 of channel portion 5 is arranged so far down in pouring spout 3, or spout 3 extends so far above rim portion 8 respectively, that there is no interference or prevention of inserting a filling nozzle.

Due to the fact that the channel portions may be provided integrally with the container, such a method of manufacture will imply few alterations of the production tools that are already in use for known containers. It should be understood, however, that the method according to the invention might also be used with existing containers of a suitable material, since a channel portion as disclosed above may easily be provided by shaping the container material in the area of the pouring spout. Such subsequent shaping will, especially, be considered in connection with reusable containers.

In Figures 1 and 4 two lines have been drawn, a first line LL which is the vertical line, i.e. a vertical line throgh the container in a standing position as shown in Figure 1, and a second line, i.e. the pouring spout line HL which is a line along the axis of pouring spout 3.

Between vertical line LL and pouring spout line HL there is an angl $\alpha$ indicating the inclination of pouring spout 3 relative vertical line LL.

This angle $\alpha$ is of great importance in constructing a pouring spout providing the desired properties of the contain-

er according to the present invention, i.e. prevention of a pulsating discharge of the content of a container when said container is emptied, as disclosed above.

In the following further embodiments of cans according to the invention will be disclosed, said cans being provided with various pouring spouts as regards the positioning of the spout, its inclination and height as well as regarding the ratio of the free discharge area and the light opening of the pouring spout.

In Figures 5, 6, and 7 diagrammatic side elevations are shown of an alternative embodiment of a container, here designated 1a and shown in various pouring positions. Pouring spout 3a is, in this case, positioned closer to center line ML and the handle 2a of the container as compared with the embodiment shown in Figures 1, 2, and 4.

In Figures 5, 6, and 7 a pouring spout line HL is shown and in this embodiment pouring spout line HL forms an angle $\alpha = 0$, i.e. pouring spout 3a stands vertically on top of the container.

In Figures 5, 6, and 7 a dot-and-dash extension of pouring spout 3a is also shown and designated 3a', and in Figures 5 and 6 the influence of such an extension on the outlet conditions is shown.

In Figures 5 - 7, furthermore, 5a designates the channel portion 5a formed in the upper part of the container and extending into the opening portion of pouring spout 3a, as disclosed in connection with Figures 1-4.

In Figure 6 container 1a is shown in a pouring position where both pouring spout line HL and center line ML form an angle $\beta$ with liquid level 4aa, said liquid level here covering the discharge area of liquid $A_V$, whereas area $A_L$ in the pouring spout is available to air flowing in through pouring spout 3a and further on, through channel portion 5a to flow into the space above liquid level 4aa.

In Figure 7 the same container as in Figure 6 is shown, but liquid level 4aa' is raised to illustrate how the extension 3a' of pouring spout 3 can cause a situation where the liquid in the container covers both liquid discharge area $A_V$ and air inflow area $A_L$ before the liquid flows across the upper rim 3'

of pouring spout 3a'.

Comparing Figures 6 and 7 we find that there is a limit to the increase of height of pouring spout 3a, the pouring conditions being far more advantageous in Figure 6, where a low pouring spout 3a is used, than in Figure 7, where the increased height of pouring spout 3a' has its effect.

In the enbodiment shown in Figures 8 and 9 a variant is disclosed implyong that container 1b has a pouring spout 3b positioned still closer to handle 2b. This means that by inclining container 1b according to Figure 9 in an angle $\beta$ , even though the angle of pouring spout 3b, i.e. angle $\alpha$ is 0 in this case, more advantageous pouring properties than in the case of Figure 6 will be achieved. This is due to the fact that in a structure according to Figure 9 the hazard of damming up liquid when pouring from a filled container will be reduced because pouring spout 3b will result in discharge through discharge area $A_V$ without air inflow area $A_L$ being covered by the discharging liquid already at a smaller angle of inclination $\beta$ of the container. Furthermore, it should be understood, that the closer to the container side of the handle 2b pouring spout 3b is positioned, the higher a pouring spout you can have. Besides, it is still possible to have a pouring spout 3b that is vertical, i.e. having an angle of inclination $\alpha$ equalling 0.

In Figures 10 and 11 a further diagrammatic embodiment of a container 1c is shown. This container shows a pouring spout 3c that is positioned at the opposite face to pouring handle 2c, and pouring spout 3c forms an angle $\alpha$ 0 with center line. As an alternative to pouring spout 3c dotted lines show an alternative pouring spout 3c' having an angle of inclination $\alpha$ c of substantially $33^{\circ}$.

As will appear from Figure 11, with a straight pouring spout 3c the situation might easily occur when, pouring from container 1c, the liquid covers both the discharging area $A_V$ of the liquid and the inflow area $A_L$ of the air before the liquid overflows upper rim 3" of pouring spout 3c. If, however, a pouring spout 3c' forming an angle $\alpha$ c with center line ML or the vertical line respectively is used pouring spout

3c' will permit liquid discharge from the container at a much more acute angle of inclination $\beta$ of the container without the liquid level covering air inflow area $A_L$. Even with pouring spout 3c' extended upwards there would, within certain limits, still be more advantageous pouring properties than in case of the straight pouring spout 3c shown in full lines in Figures 10 and 11.

It is, in other words, of great importance that angle $\alpha$ of the pouring spout, here selected to be between $0^{\circ}$ and $33^{\circ}$, is adapted to the remaining geometric dimensions of container 1a. Also, it is important that the height of pouring spout 3c is adapted to pouring spout angle $\alpha$ and to the filling level and the ratio between air inflow area $A_L$ and liquid discharge area $A_V$ as well.

In Figure 12, showing a diagrammatic side elevation like Figure 1, a container 1d is shown having a pouring spout 3d where the free discharge area of liquid $A_V$ is made relatively much larger than is the case with container 1 in Figures 1 and 2. Here, rim portion 8d of channel portion 5 forming the area $A_L$ of the entering air is decreased correspondingly.

A comparison with the pouring conditions in Figure 4 will show that with the embodiment of Figure 12 it is not necessary to incline container 1d as much as container 1 in Figure 4 in order to achieve discharge of liquid 11d from container 1d. This is due to the fact that liquid discharge area $A_V$ is made as large as possible relative to air inflow area $A_L$. It is suitable to make $A_V$ as large as possible, especially in connection with liquids having high viscosity or inertia, so as to facilitate liquid discharge in a pouring situation. It is, however, necessary to ensure that the positioning of pouring spout 3d relative to the pouring direction of the container, i.e. relative to the positioning of the handle, and the height of the pouring spout as well as its angle of inclination $\alpha$ are adapted to the liquid in question in order to achieve an optimal discharge of said liquid.

In Figure 13, showing a side elevation like Figure 12, a container 1e is provided with a pouring spout 3e having a larger spout angle $\alpha$ than that of the embodiment shown in Fi-

gure 12, but having a rim portion 8 of the air inflow channel 5e that is not retracted as much as rim portion 8d in the embodiment shown in Figure 12.

The relatively seen, much larger angle $\alpha$ of pouring spout 3e, however, means that container 1e must not be inclined so much in the pouring direction, i.e. vertical line LL needs not have its angle $\beta$ relative to the liquid level 4e' reduced as much as shown in the embodiment of Figure 12 for achieving a relatively large discharge of liquid 11e from container 1e. A comparison between Figures 12 and 13 shows that the angle of inclination $\alpha$ of pouring spout 3e is of great importance for achieving a non-pulsating discharge of liquid, since in embodiment 13 an earlier discharge of liquid is achieved even though the discharge area of liquid $A_V$ is comparatively smaller than that of Figure 12.

In Figure 13 an elongation 3e' of pouring spout 3e is, also, indicated and, as appears from the pouring condition in Figure 13, there will still be a relatively heavy discharge of liquid 11e' over the rim of the prolonged pouring spout 3e' even with a smaller inclination of vertical line LL as compared to Figure 12, and even with a smaller discharge area $A_V$ of the liquid in the container.

It should be understood that angle $\alpha$ of the inclination of the pouring spout may be selected within wide limits. In the embodiments disclosed above angles $\alpha$ are shown within the range of 0-33$^{o}$, but these values may, naturally, be changed in view of other conditions of containers.

In the embodiment shown in Figures 10 and 11 it may, e. g. be considered having pouring spout angles $\alpha$ of 15-90$^{o}$ or more, e.g. up to 135$^{o}$, however, the filling level of the container and the positioning of the pouring spout must, then, be considered.

CLAIMS:

1. A method in the production of a container (1) for improving the pouring properties of the container, characterized in that in the area of the pouring spout (3) of the container, preferably at or closely beneath the root (4) of said spout a channel portion (5) is formed, extending from the opening area ($A_V$, $A_L$) of said pouring spout in a direction opposite to the pouring direction (H), said channel portion (5) in the opening area reducing the free discharge area ($A_V$, $A_L$) of the content of the container (1), but at the reduced area ($A_L$) leaving the channel portion (5) open to inflow of air into the container (1).

2. A method as claimed in claim 1, characterized in that said channel portion (5) is formed during the manufacture of container (1) as an integrated part of the container, said container (1) being of a material permitting shaping, moulding, compression moulding, etc.

3. A method as claimed in claim 1, characterized in that said channel portion is formed after the manufacture of the container per se, if desired as an added member.

4. A method as claimed in one of claims 1-3, where said container (1) has a shape provided for pouring in one definite direction (H), characterized in that only one channel (5) is formed, extending from the opening area of pouring spout (3) in the opposite direction of the pouring direction (H).

5. A method as stated in one of claims 1-3, where said container has a shape provided for pouring in an arbitrary direction, characterized in that several channel portions are provided, preferably uniformly distributed about the area of the pouring spout, each channel portion in the area of the opening portion contributing to reduce the free discharge area of the pouring spout, but at the reduced area leaves the channel portion in question open for inflow of air into

the container in the space that is emptied of its content.

6. A method as claimed in one of the preceding claims, c h a r a c t e r i z e d i n that the angle ($\alpha$) formed by pouring spout (3) of the container with a vertical axis (LL) through the container (1-1e) is selected dependent on the positioning of the pouring spout (Figure 5, Figure 8, and Figure 10), the height of the pouring spout (Figure 6 and Figure 13), the clear opening of the pouring spout (Figure 12 and Figure 13), or the ratio between liquid discharge area ($A_V$) and air inflow area ($A_L$) (Figures 2, 12, 13), or a combination of one or several of said factors.

7. A method as claimed in claim 6, c h a r a c t e r i z e d i n that the pouring spout angle ($\alpha$) is preferably, selected so as to be larger in the direction from the handle side the closer pouring spout (3c, 3d, 3e) is placed to the container portion furthest off the handle side of the container (Figures 11 and 13).

8. A method as claimed in claim 6 or 7, c h a r a c t e r i z e d i n that the angle ($\alpha$) of the pouring spout (3b) with vertical line (LL) is selected to be very small, or substantially equal to 0 when said pouring spout (3b) is placed very close to the handle side (2b).

9. A method as claimed in one of claims 6-8, c h a r a c t e r i z e d i n that the angle of inclination is selected in the order of 15-90$^{\circ}$ or more, preferably 15-30$^{\circ}$, when pouring spout (3c', 3d, 3e) is placed on the opposite side of the pouring handle (2c).

10. A method as claimed in claim 9, c h a r a c t e r i z e d i n that the pouring spout angle ($\alpha$) is selected to be larger than 90$^{\circ}$, e.g. between 90$^{\circ}$ and 135$^{\circ}$.

11. A method as claimed in one f claims 6-10, c h a r a c t e r i z e d i n that the height of pouring spout (3a', 3e') is selected dependent on the pouring spout angle ($\alpha$), an increased pouring spout height necessitating compensation by a larger pouring spout angle ($\alpha$) in the direction from the handle side, so that the liquid level may pass over the rim (3', 3") of the pouring spout without covering

the air inflow area ($A_L$) of channel portion (5a, 5e) (Figures 6 and 12).

12. A method as claimed in one of claims 6 - 11, characterized in that with containers containing more viscous liquids a comparatively larger pouring spout angle ($\alpha$), a comparatively lower pouring spout height, and a positioning of said pouring spout closer to the handle side are selected, at the same time as the liquid discharge area ($A_V$) is made as large as possible in relation to the clear opening of the pouring spout or the air inflow area ($A_L$) resp.

13. A method as claimed in one of claims 6 - 12, characterized in that the container is produced by extruding a hose shaped blank that is batchwise pinched at one end for forming the bottom of the container, compressed air inside it simultaneously preventing the hose from collapsing, and that the pouring spout with the adapted channel portion extending from the opening area of the pouring spout and in a direction opposite to the discharge direction is formed by pinching the extruded blank immediately in connection with the extrusion process.

14. A container having improved pouring properties, characterized in that in the area of the pouring spout (3) of the container it comprises a channel portion (5) extending from pouring spout (3) and along container wall (6), preferably towards the space (7) of the container being first emptied of content when the content is discharged, said channel portion (5) in the opening area ($A_V$, $A_L$) reducing the free discharge area of pouring spout (3) for the content of the container but at the reduced area ($A_L$) leaving the channel portion (5) open for inflow of air into the container.

15. A container as claimed in claim 14, characterized in that the rim portion (8) of channel portion (5) reducing the free discharge area of pouring spout 3 at the pouring spout opening is placed so deeply relative to pouring spout (3) that insertion of a filling nozzle is not prevented.

16. A container as claimed in claim 14 or 15, characterized in that the container comprises one or several channel portions shaped integrally with the container.

17. A container as claimed in one of claims 14 - 16, characterized in that the container comprises a number of channel portions, preferably uniformly distributed about the pouring sprout.

18. A container as claimed in one of claims 14 - 17; characterized in that pouring spout (3a, 3b) is placed in an area of the container extending from the handle side (2a, 2b) and past center line (ML) of the container, at the same time as the pouring spout angle ($\alpha$) relative to a vertical line (LL) through the container is in the order of 0-35°.

19. A container as claimed in claim 18, characterized in that the container (1, 1c, 1d, 1e) has a pouring spout (3, 3c, 3d, 3e) arranged in the area between the center line (ML) of the container and the container portion furthest off the handle side (2c), the pouring spout angle ($\alpha$) at the same time being in the order 0-135°, preferably 0-33°.

20. A container as claimed in claim 18 or 19, characterized in that the pouring spout angle ($\alpha$) has such a value in relation to the height of the pouring spout and its positioning, and to the liquid discharge area ($A_V$) og the pouring spout relative to the air inflow area ($A_L$) that the liquid level (4e') will not block the clear opening of the pouring spout and, thus, the air inflow area ($A_L$) when discharging of liquid is started from a filled container (1e) (Figure 13).

Fig.1.

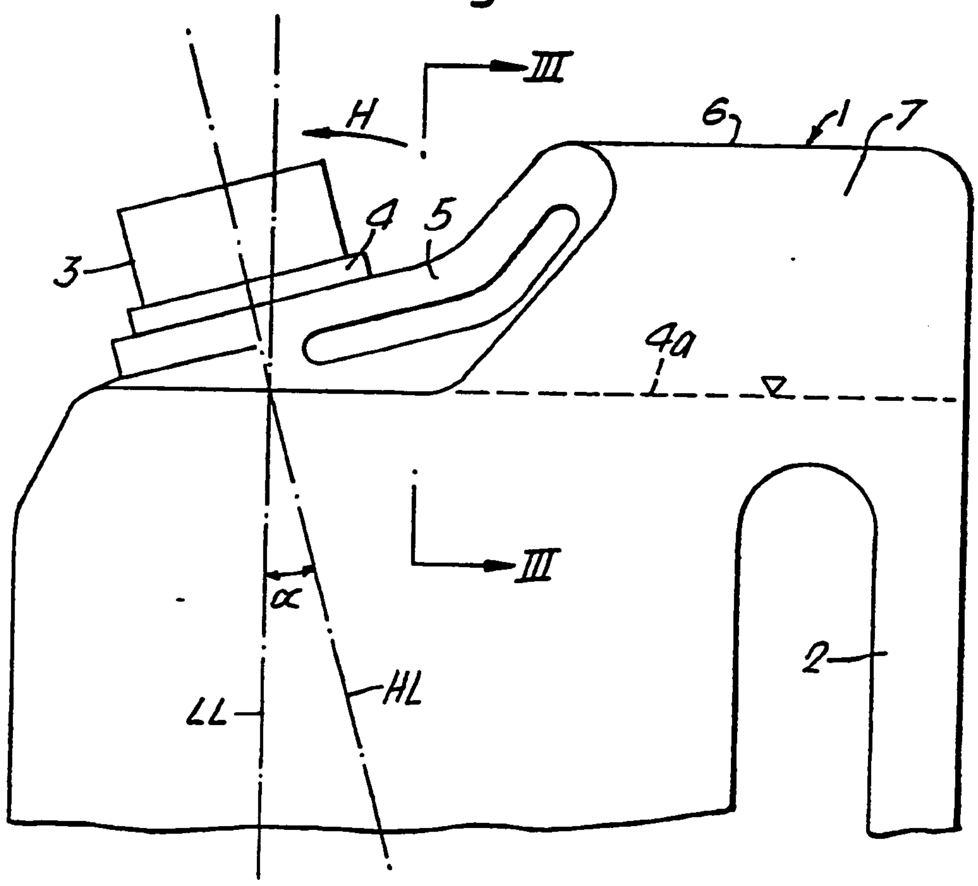
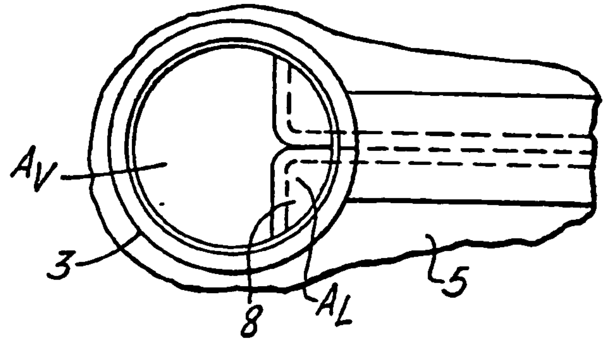



Fig.2.



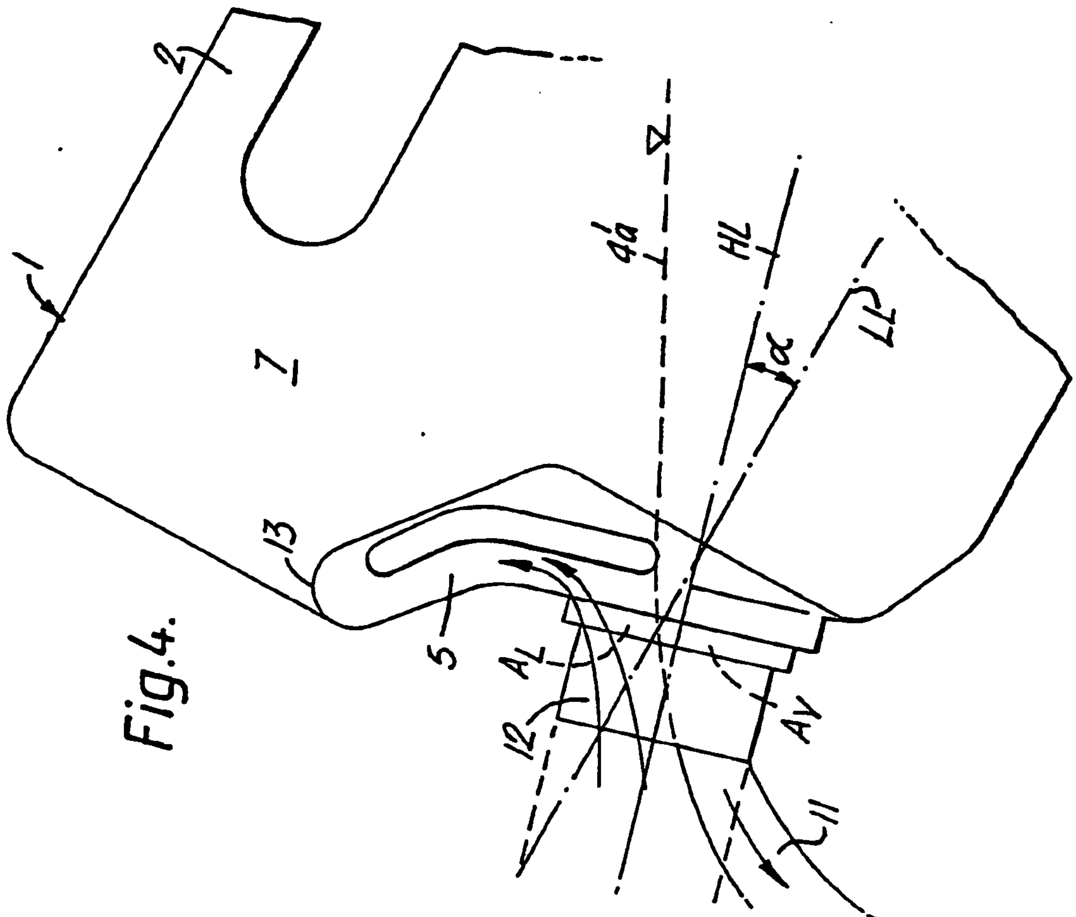



Fig.4.

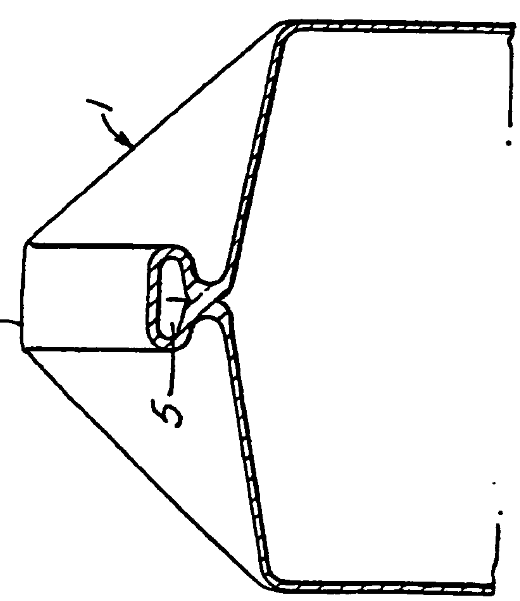



Fig.3.

Fig.5.

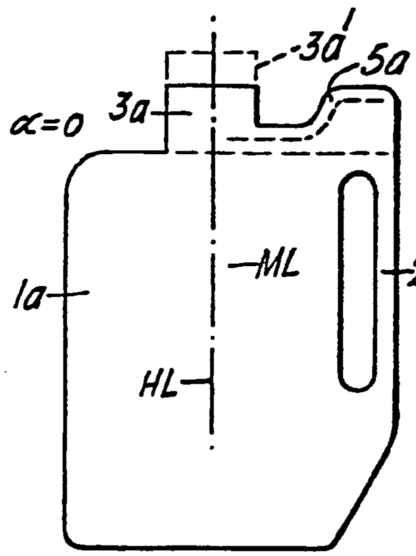



Fig.6.

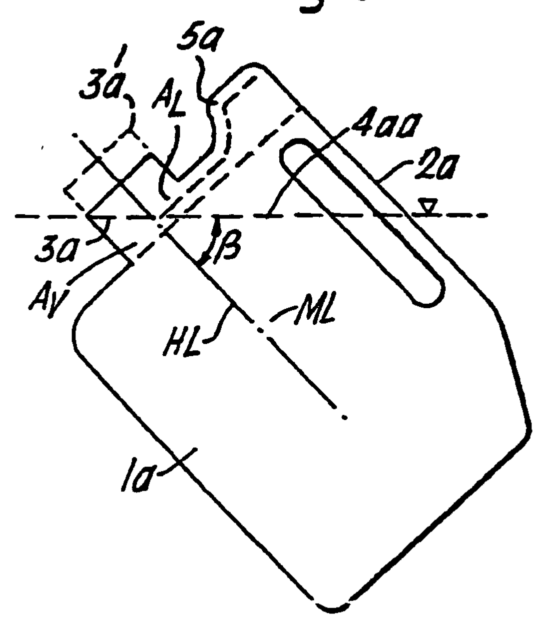



Fig.7.

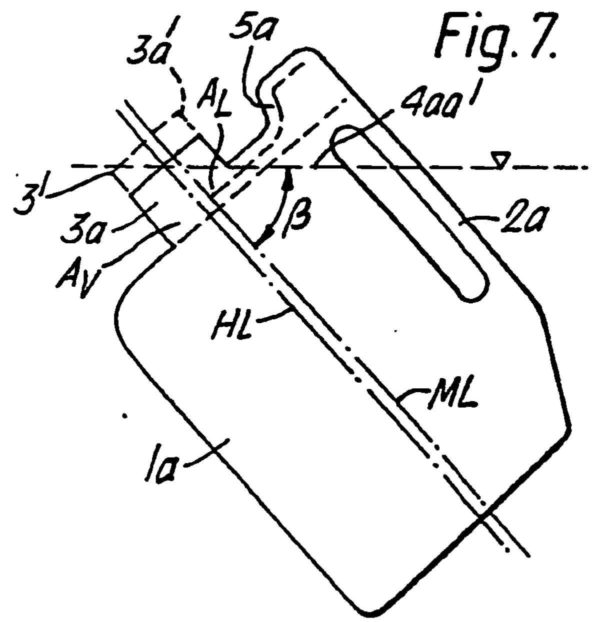


Fig.8.

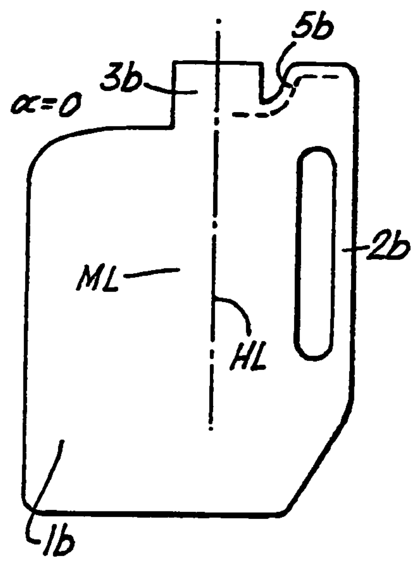



Fig.9.

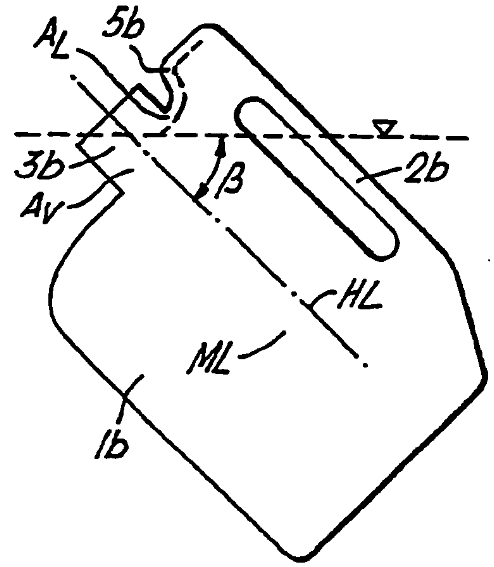



Fig.10.

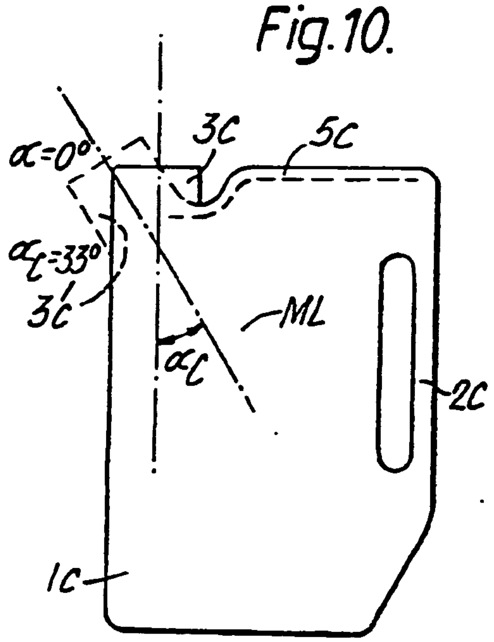



Fig.11.

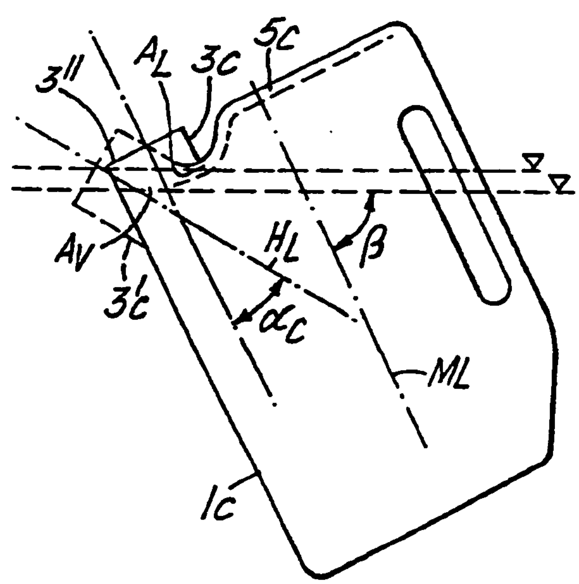


Fig.12.

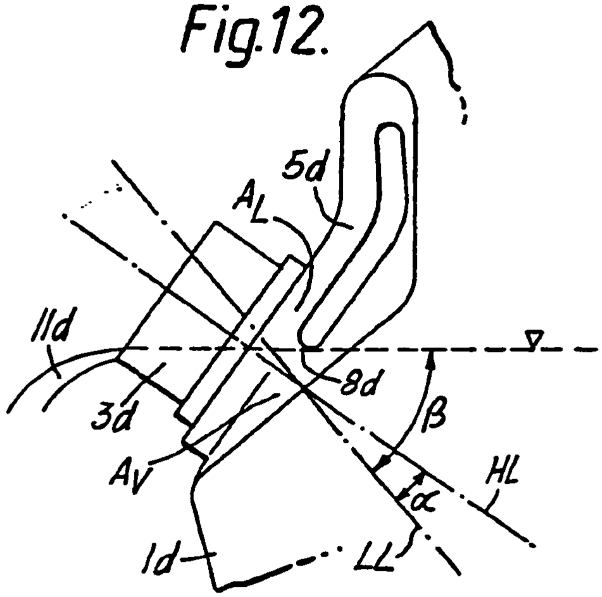
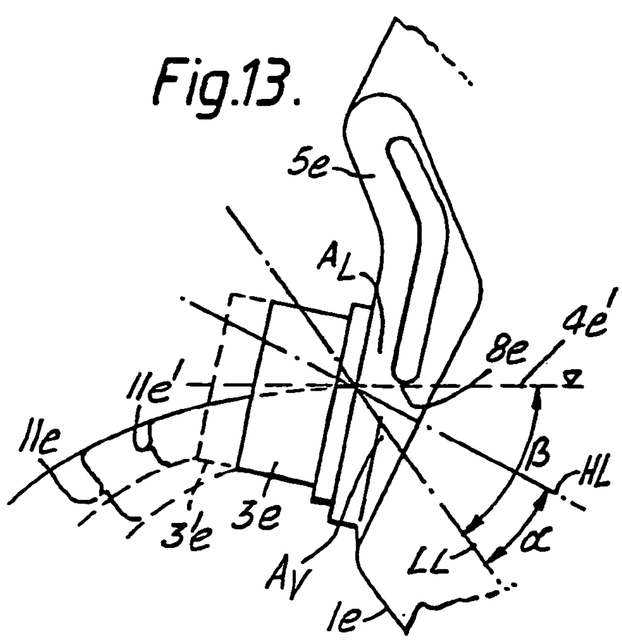



Fig.13.



# INTERNATIONAL SEARCH REPORT

International Application No PCT/NO85/00065

**I. CLASSIFICATION OF SUBJECT MATTER** (if several classification symbols apply, indicate all) [8]

According to International Patent Classification (IPC) or to both National Classification and IPC 4

B 65 D 25/42

**II. FIELDS SEARCHED**

Minimum Documentation Searched [7]

| Classification System | Classification Symbols |
|---|---|
| IPC 4 | B 65 D 23/04, 25/38-/42, 51/16, 83/00 |
| US Cl | 220:44; 222:566-575 |

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

SE, NO, DK, FI classes as above

**III. DOCUMENTS CONSIDERED TO BE RELEVANT** [9]

| Category [*] | Citation of Document, [11] with indication, where appropriate, of the relevant passages [12] | Relevant to Claim No. [13] |
|---|---|---|
| X | GB, A, 2 098 572 (CHEVRON RESEARCH) 24 November 1982<br>& BE, 892392<br>FR, 2501632<br>NL, 8200965<br>DE, 3208077<br>SE, 8201421 | 1,2,4,6,14<br>15,16,18 |
| X | GB, A, 1 329 471 (SAINT-GOBAIN) 12 September 1973<br>& NL, 7018107<br>FR, 2070979<br>DE, 2061144<br>CH, 529672<br>BE, 760027 | 1,3,4,5,14<br>15,17,19,20 |
| Y | DE, C2, 2 026 922 (SCHIEMANN) 16 December 1971<br>figs 1 and 3<br>& CH, 534076<br>CA, 975310 | 1,3,4 |

.../...

* Special categories of cited documents: [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

**IV. CERTIFICATION**

| Date of the Actual Completion of the International Search | Date of Mailing of this International Search Report |
|---|---|
| 1986-01-16 | 1986-01-17 |
| **International Searching Authority** | **Signature of Authorized Officer** |
| Swedish Patent Office | Petter Sörsdahl |

MJ

International Application No. PCT/NO85/00065

**III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)**

| Category* | Citation of Document, with indication, where appropriate, of the relevant passages | Relevant to Claim No |
|---|---|---|
| Y | US, A, 3 844 456 (SHIEMANN) 29 October 1974 col 3, line 46 to col 4, line 10; figs 4-7 | 1,3,4 |
| Y | NO, B, 120 506 (MARCEL) 26 October 1970 page 2, lines 7-16; figs 1 and 3 | 8,19,20 |